

Application No. 10/733,490  
Response to Office Action

Customer No. 01933

### REMARKS

Reconsideration of this application, as amended, is respectfully requested.

### THE CLAIMS

Claims 1 and 2 have been canceled, and claims 3 and 4 have been prepared corresponding to the subject matter of claims 1 and 2 rewritten in better U.S. form.

No new matter has been added, and it is respectfully requested that new claims 3 and 4 be approved and entered.

### THE PRIOR ART REJECTION

Claim 1 was rejected under 35 USC 102 as being anticipated by JP 2000-351076 ("JP '076"), and claim 2 was rejected under 35 USC 103 as being obvious in view of the combination of JP '076 and USP 5,416,297 ("Luo et al"). These rejections, however, are respectfully traversed.

According to the present invention as recited in new independent claim 3, the plasma torch is first positioned at an initial height with respect to the workpiece. A main arc is formed between the electrode and the workpiece by initiating a pilot arc between the electrode and the nozzle to form the main arc, and then the plasma torch is positioned at a piercing height

Application No. 10/733,490  
Response to Office Action

Customer No. 01933

with respect to the workpiece to perform a piercing operation. The main arc is maintained while the plasma torch is positioned at the piercing height, until completion of the piercing operation. After the piercing operation, the plasma torch is moved to a cutting height with respect to the workpiece to perform a cutting operation. According to the present invention as recited in new independent claim 3, the initial height is less than or substantially equal to the cutting height and at a position at which a double arc does not occur, and the piercing height is larger than the initial height.

With this method, it is possible to reduce the pilot arc current and to transition smoothly from the pilot arc to the main arc. Thus, the nozzle of the plasma torch is less susceptible to melting damage caused by the pilot arc, and its service life may therefore be extended. In addition, since the plasma torch is positioned at a higher piercing height after the main arc is formed, the plasma torch is less susceptible to spatter caused by the piercing operation.

As recognized by the Examiner, the Abstract of JP '076 discloses igniting a plasma arc at height H1 and conducting a piercing operation at height H2. The Examiner further asserts that the abstract of JP '076 discloses that after piercing "the torch is moved to the cutting position H1 for cutting."

Application No. 10/733,490  
Response to Office Action

Customer No. 01933

It is respectfully pointed out, however, that the Abstract of JP '076 does not contain any description of the position of the plasma torch during cutting. In addition, it is respectfully pointed out that the Abstract of JP '076 does not refer to position H1 as the "cutting position." Indeed, the Abstract of JP '076 clearly does not contain any description of the operation of the plasma torch after the piercing operation. And it is respectfully submitted, therefore, that the Examiner's assertion that "Japanese patent Abstract 1076' [sic]" discloses, "[after] piercing the torch is moved to the cutting position h1 for cutting" is not at all supported by the Abstract (or drawings) of JP '076.

JP '076 does describe the problems of the prior art whereby the pierce-able thickness of a plate is less than the cuttable thickness of the plate. That is, when the plate is thick, the time required for the piercing operation is greater and the amount of molten metal that blows up in the form of spatter increases. Therefore, when the plate to be pierced is thick, it is necessary to set the plasma torch at a large height with respect to the workpiece for piercing.

JP '076 explains that it is advantageous to set the plasma torch at an initial height at which the plasma arc can be

Application No. 10/733,490  
Response to Office Action

Customer No. 01933

ignited, and that the plasma torch is then moved to a higher height for piercing thick plates.

It is respectfully submitted, however, that JP '076 does not disclose, teach or suggest that the initial height is substantially equal to or less than the cutting height of the torch. Indeed, according to JP '076, the initial height  $H_1$  is preferably set to be the greatest height at which the plasma arc can be successfully ignited.

Still further, it is respectfully pointed out that JP '076 (which is assigned to the same corporate entity as the present application) is described in the Background Art on pages 2 and 3 of the specification of the present application, and that a piercing and cutting process according to JP '076 is shown in Fig. 5(b) of the present application. As shown in Fig. 5(b), according to JP '076 the height suitable for cutting ( $H_2$  in Fig. 5(b)) is less than the height at which the plasma arc is ignited before piercing ( $H_1$  in Fig. 5(b)).

Thus, it is respectfully submitted that JP '076 clearly does not at all disclose, teach or suggest the feature of the claimed present invention whereby the initial height is less than or substantially equal to the cutting height of the plasma torch with respect to the workpiece at which a cutting operation is performed.

Application No. 10/733,490  
Response to Office Action

Customer No. 01933

Finally, it is noted that Luo et al has merely been cited for the disclosure of a semiconductor switch.

Accordingly, it is respectfully submitted that the present invention as recited in new independent claim 3, and new claim 4 depending therefrom, clearly patentably distinguishes over JP '076 and Luo et al, taken singly or in combination, under 35 USC 102 as well as under 35 USC 103.

\* \* \* \* \*

In view of the foregoing, entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,



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